

NASA TECH BRIEF

Lewis Research Center



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Continuous Monitor for Gas Ratios in a Mixture

The problem:

To devise a unit which will continuously monitor the ratio of a mixture of two gases in a flowing system. The device must be lightweight, compact, reliable, easy to install, and also produce a simple output signal for a controller. Ordinarily, a gas sample must be taken and an analysis made using a mass spectrometer, but this is costly, time consuming, and does not produce a continuous record.

The solution:

Use a fluidic oscillator incorporating a piezo-electric transducer to sense molecular weight of the gas mixture. The frequency of oscillation is measured by the transducer and the signal can be converted to an AC output.

How it's done:

A fluidic oscillator operates on the principle that a pressure pulse propagates through the feedback loop at acoustic velocity. For steady state conditions, the acoustic velocity is inversely proportional to the square root of the molecular weight of the gas mixture. The frequency output is very stable and the fluidic oscillator can be calibrated for any range of temperatures and pressures. For changes of $\pm 15\%$ in molecular weight of the mixture, a linear relationship between molecular weight and frequency can be used for proportional adjustments by a controller.

Notes:

1. A related application is described in NASA Tech Brief 67-10063, "Fluidic Oscillator Used as Humidity Sensor."
2. The following documentation may be obtained from:
National Technical Information Service
Springfield, Virginia 22151
Single document price \$6.00
(or microfiche \$0.95)

Reference: NASA TM-X-1939 (N70-17724),
Sensing Molecular Weights of Gases with a
Fluidic Oscillator

3. Technical questions may be directed to:
Technology Utilization Officer
Lewis Research Center
21000 Brookpark Road
Cleveland, Ohio 44135
Reference: B72-10229

Patent status:

No patent action is contemplated by NASA.

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